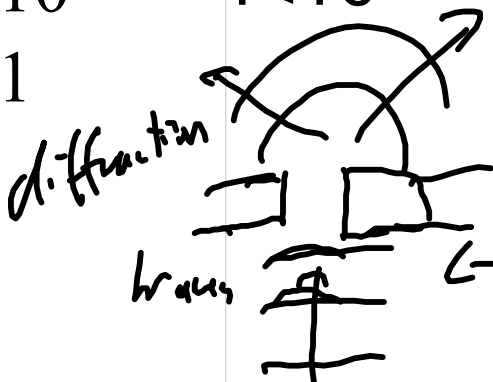


# Test Friday Ch14,15,16

## Electromagnetic Radiation - EM rad

### Types p 330

types of EM	$\lambda$ (m)	f (Hz)	notes
Radio waves	$\lambda > 10^0$ $\lambda > 1$ $v = \lambda f$	$f < 10^8$ 	radio stations 104.9 FM = 104.9 MHz AM = kHz <u>AM diffracts better</u> and reflects off the atmosphere
Microwaves	$1 - 10^{-2}$	$10^{10} - 10^9$	cooking, cell phones, Wifi
infrared	$10^{-2} - 10^{-5}$	$10^{10} - 10^{14}$	night vision cameras, remotes, thermal, absorbed by

			greenhouse gasses
visible light (humans)	red - 700nm blue - 400 nm	$10^{15}$	you can see it white light is composed of various wavelengths
Ultraviolet (UV)	$10^{-7}$ - $10^{-8}$	$10^{16}$	lowest frequency that is ionizing - causes cancer
X-rays	$<10^{-8}$	$>10^{17}$	-see your bones -created by high speed charged particles stopping
gamma rays	$<10^{-8}$	$>10^{17}$	-created from nuclear changes -tend to have very high energies

- Electromagnetic radiation is created by:
1. Classical - changing electric fields - accelerating electrons for example
  2. Quantum - charged particles "jump" energy states producing a photon of EM radiation of energy  $E=hf$   $f$  is frequency and  $h$  is Planck's constant  $6.626 \times 10^{-34} \text{ Js}$

Because light is made of little particle waves, when it goes through a prism or a water drop, you see a rainbow. The different wave/particles refract at slightly different angles.



all electro magnetic radiation moves at the speed of light in a vacuum

$$c=3.00 \times 10^8 \text{ m/s}$$

MHz

eg. you listen to the radio at 104.9FM,  
what is the wavelength of the radio  
signal?

$$104.9 \text{ FM} = 104.9 \text{ MHz}$$

$$v = 3.00 \times 10^8 \text{ m/s}$$

$$v = \lambda f \quad \text{so } \lambda = v/f =$$

$$3.00 \times 10^8 \text{ m/s} / 104.9 \times 10^6 \text{ Hz}$$

$$300/104.9 = 2.8599 \text{ m}$$

$$2.86 \text{ m}$$

p332 practice problems 1-5

skip p333-336

p342 CR 2.1-2.4